REMARKS

The Office Action dated on March 7, 2005 has been received and its contents carefully considered. In this Amendment, Applicant has editorially amended the specification to make certain cosmetic changes. Claims 1, 7, 12, 15 and 19 have been amended to more specifically claim the disclosed invention. Claims 1 and 12 are independent claims. Claims 1-19 remain pending in the application. For at least the following reasons, it is submitted that this application is in condition for allowance.

Claims 1, 2, 4-6, 12-14 have been rejected under 35 U.S.C. 102(b) as allegedly anticipated by Hayashi (U.S. Patent No. 3,875,501). The rejection is respectfully traversed for at least the following reasons.

It is well settled that a reference may anticipate a claim within the purview of 35 USC section 102 only if all the features and all the relationships recited in the claim are taught by the reference structure either by clear disclosure or under the principle of inherency.

Applicant's independent claim 1, as amended, is directed an analog signal measuring device for measuring an analog signal comprising (among other features):

> ...
> **a digital controller for generating a measured value of the analog signal, comprising:**
> **a pulse width modulation (PWM) controller for outputting a programmable pulse signal having a pulse width that is adjustable so as to measure the analog signal; and**
> **a counter having a frequency that is based on the frequency of the programmable pulse signal;**
> a waveform converter, coupled to the PWM controller, for generating and outputting a carrier signal according to the programmable pulse signal; and
> a comparator, coupled to the waveform converter and the counter of the digital controller, for comparing the carrier signal to the analog signal and then generating a comparison pulse signal, which enables the counter to start counting and to generate a count value, wherein the digital controller generates measured value of the analog signal according to the count value.

(*Emphasis added.*)

With the use of the digital controller as recited in claim 1, the analog signal measuring device is adaptable to various applications for the analog voltage measurement through the programmable pulse signal. The digital controller only needs to adjust the pulse width of the pulse signal output from the PWM controller. The analog signal may be measured using the digital controller without an ADC, so the cost may be reduced. The power loss is smaller, so the power may be saved, and the generated heat may be suppressed. (see e.g., paragraphs [0024]-[0029])

In rejecting claim 1, the Office Action points to the disclosure of Hayashi (FIG. 1; column 3, lines 25-44) as allegedly teaching an analog signal measuring device, as recited in Applicant's claim 1. However, there is no disclosure or suggestion by this cited reference of "**a digital controller** for generating a measured value of the analog signal, comprising **a pulse width modulation (PWM) controller for outputting a programmable pulse signal having a pulse width that is adjustable so as to measure the analog signal**; and **a counter having a frequency that is based on the frequency of the programmable pulse signal**", as Applicant's claim 1 now requires (*emphasis added*). Further, there is no disclosure or suggestion by Hayashi of **a pulse width modulation (PWM) controller for outputting a programmable pulse signal having a pulse width that is adjustable so as to measure the analog signal**, as claim 1 requires. The Office Action has asserted that Title of the cited reference teaches a pulse width modulation (PWM) controller (see Page 2 of the Office Action). Applicant respectfully disagrees with this assertion because the phrase "pulse width modulation type" in the Title of the cited reference does not teach or suggest **a pulse width modulation (PWM) controller, included in a digital controller, for outputting a programmable pulse signal having a pulse**

width that is adjustable so as to measure the analog signal, as expressly recited in Applicant's claim 1. Instead, the "pulse width modulation type resistance deviation measuring apparatus" in Hayashi is merely a description of the disclosure in FIG. 1 of the cited reference (see column 1, lines 49-66; column 3, lines 35-44), rather than teaching or suggesting a pulse width modulation controller, as recited in Applicant's claim 1.

As such, the structure of claim 1 is not disclosed (nor is it suggested) by Hayashi. Therefore, claim 1 is not anticipated (or rendered obvious) by the cited reference. Moreover, since claims 2, 4-6 depend from claim 1, claims 2, 4-6 patently define over the cited art. Accordingly, the rejection of claims 1-2 and 4-6 should be withdrawn.

Regarding Applicant's independent claim 12, the Office Action points to Hayashi (FIG. 1; column 3, lines 25-44) as allegedly disclosing an analog signal measuring method utilizing a digital controller having a counter to measure an analog signal, as claim 12 requires. It is noted that in rejection of claim 12, the passage and drawing relied on by the Examiner is the same relied on in rejecting claim 1. Applicant respectfully traverses the rejection.

Applicant's claim 12, as amended, recites:

> 12. An analog signal measuring method utilizing a digital controller having a counter to measure an analog signal, the analog signal measuring method comprising the steps of:
>
> (k). **outputting a programmable pulse signal having a pulse width that is adjustable so as to measure the analog signal by the digital controller;**
>
> (m). generating a carrier signal according to the programmable pulse signal;
>
> (o). comparing the carrier signal to the analog signal and thus generating a comparison pulse signal; and
>
> (p). **in response to the comparison pulse signal, enabling the counter to start counting and to generate a count value according to the comparison pulse signal, and getting a measured value of the analog signal according to the count value by the digital controller, wherein the frequency of the counter is based on the frequency of the programmable pulse signal.**

(*Emphasis added.*)

Consistent with the discussion on the patentability of claim 1, it is submitted that Hayashi does not disclose or otherwise suggest features of claim 12 that "**outputting a programmable pulse signal having a pulse width that is adjustable so as to measure the analog signal by the digital controller**" and "**in response to the comparison pulse signal, enabling the counter to start counting and to generate a count value according to the comparison pulse signal, and getting a measured value of the analog signal according to the count value by the digital controller, wherein the frequency of the counter is based on the frequency of the programmable pulse signal**" (*emphasis added*), as claim 12 requires.

For at least the above reasons, it is respectfully submitted that claim 12 is not anticipated (or rendered obvious) by Hayashi. Moreover, as claims 13 and 14 depend from claim 12, claims 13 and 14 are also not anticipated or rendered obvious by Hayashi. Thus, it is submitted that the rejection of claims 12-14 be withdrawal.

Claims 3, 7-11, and 15-19 stand rejected under 35 U.S.C. §103(a) as allegedly unpatentable over Hayashi (U.S. Patent No. 3,875,501) in view of Katagiri (U.S. Patent No. 5,355,136). The rejection is respectfully traversed.

In rejecting these claims, the Examiner acknowledges that "Hayashi did not expressly disclose comparison pulse signal having a positive edge for enabling the counter to start counting, and a negative edge for disabling the counter from counting." In addition, the Examiner asserts that Katagiri discloses positive edge for enabling the counter 31 to start counting, and a negative edge (trailing edge) for disabling the counter and interrupt countroller (MICROPROCESSOR) for enabling and disabling the counter (column 5, lines 12-26; FIG. 2). The Examiner concludes that it would have been obvious for one of ordinary skill in the art at the time of the invention to modify Hayashi by adding interrupt controller disclosed by Katagiri

having positive edge for enabling the counter to start counting, and a negative edge (trailing edge) for disabling the counter as disclosed by Katagiri for starting and stopping counter for measuring a count value indicative of pulse width for accurately measuring analog signal (voltage).

According M.P.E.P §2143 "Basic Requirements of a Prima Facie Case of Obviousness",

> To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

According to the above discussion on the patentability of independent claims 1 and 12, from which claims 3, 7-11, and 15-19 depend respectively, the primary reference, Hayashi, fails to disclose or even suggest the features recited in claims 1 and 12. Besides, there is no disclosure or suggestion by Katagiri of the features recited in claims 1 and 12 that are missing from Hayashi. For example, either Hayashi or Katagiri does not teach **a digital controller for generating a measured value of the analog signal, comprising a pulse width modulation (PWM) controller for outputting a programmable pulse signal having a pulse width that is adjustable so as to measure the analog signal; and a counter having a frequency that is based on the frequency of the programmable pulse signal**, as Applicant's claim 1 requires.

In addition, Applicant asserts that no proper motivation is provided from the prior art references to modify Hayashi, as proposed by the Examiner, in view of Katagiri to arrive at the claimed invention. In particular, the microprocessor of Katagiri, relied on by the Examiner as disclosing the interrupt controller of the claimed invention, as in claim 7, does not teach or otherwise suggest "**an interrupt controller, which is coupled between the comparator and**

the counter, for enabling and disabling the counter according to the comparison pulse signal", as amended claim 7 recites (emphasis added). Instead, the output from comparator of Katagiri, as shown in FIGS. 1, 2, 4, 7 and 10 for example, is fed into the timer (31, for example) directly and then the result of the timer is processed by the microprocessor.

Therefore, claims 3, 7-11, and 15-19 are *prima facie* patentable over the cited references for at least the reasons advanced above as to the patentability of independent claims 1 and 12 respectively and the reason of the recitation of addition features.

For the foregoing reasons, it is respectfully submitted that this application is in condition for allowance. Notice of such allowance and passing of the application to issue, are earnestly requested.

Should the Examiner feel that a conference would be helpful in expediting the prosecution of this application, the Examiner is hereby invited to contact the undersigned.

No fee is believed to be due in connection with this amendment and response to Office Action. If, however, any fee is believed to be due, you are hereby authorized to charge any such fee to deposit account No. 20-0778.

Respectfully submitted,

By: _____

Daniel R. McClure
Registration No. 38,962

Thomas, Kayden, Horstemeyer & Risley, LLP
100 Galleria Pkwy, NW
Suite 1750
Atlanta, GA 30339
770-933-9500